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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

A Computer Program for Processing Historic Fire Weather Data for the National Fire-Danger Rating System

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FIRDAT is a FORTRAN IV program to compute the daily components and indexes of the National Fire-Danger Rating System. FIRDAT will also compute and print the absolute, relative, and cumulative frequencies of occurrence, and print a cumulative frequency distribution for each of the components and indexes.

A description of the program and subroutine along with examples of input and output data are presented in this Note.

Keywords: Fire-Danger Rating, fire planning, fire management, data processing.

Levels for Specific Action and Manning Classes for the new National Fire-Danger Rating (NFDR) System (Deeming et al. 1972) are determined from the cumulative frequency distribution of Burning Index (BI). To obtain this distribution, the BI must be computed for all the available historic fire weather data. The computed BI's then have to be sorted into classes (or ranked) and the cumulative frequency computed. This operation normally would be quite time consuming. On a computer, however, these tasks can be accomplished accurately in a few seconds with minimum effort. Using the same approach, the effects of different land management practices or potential fire situations are easily simulated, that is, chipping versus the alternative of lopping and scattering or directional falling versus random falling, and so forth.

This report documents computer program FIRDAT constructed to perform these tasks. It is to be used in the implementation of the NFDR System, and as an aid for fire planning on the National Forests. Versions of FIRDAT are available for CDC 6400, 3300, 3100, UNIVAC 1108, and IBM System/360.[3]

Program FIRDAT

FIRDAT is the name of the program written in FORTRAN IV, which provides a fast, accurate means of computing fire behavior indexes from historic fire weather records. It will provide distributions of indexes by tabulating absolute, relative, and cumulative frequencies. A plot of the cumulative frequency distribution is also provided.

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[3]*The use of trade and company names is for the benefit of the reader; such use does not constitute an official endorsement or approval of any service or product by the U. S. Department of Agriculture to the exclusion of others that may be suitable.*

Input

The "data deck" consists of three parts:

(1) **First Lead Card (see appendix I).**— This card contains information about the observing station, data input device and the output and data input options. The station information includes station name, station number, slope class, and elevation. The data input device will designate whether the ambient weather data are available on punched cards (unit 5) or magnetic tape (unit 1-4, 6-9). The output options consist of listing all the weather data with the computed indexes and components for each day; tabulating the frequencies for each of the indexes or components and plotting a graph of the cumulative frequency distribution; and punching or writing on magnetic tape the date and values of all components and indexes. The components referred to are ignition probability, rate of spread, and energy release; the indexes are Occurrence Index, Burning Index, and Fire Load Index. These options will be discussed further in the **Output** section.

There are five input data options to the program. The option chosen will depend upon the kind of data available. (The user, not the program, chooses the option.) The data combinations which determine the option to be used are tabulated in table 1. Since the number of assumptions the program makes to satisfy the data requirements increases as the number of data parameters decreases, every effort should be made to use the most comprehensive data option.

Table 1.--Data options required for specified levels of accuracy for each model--historical analysis

Data	Data options				
	I	II	III	IV	V
Station number	x	x	x	x	x
Fuel model	x	x	x	x	x
Slope class	x	x	x	x	x
Date (yr., mo., day)	x	x	x	x	x
State of weather	x	x	x	x	x
Herb. veg. condition	x	x	x	x	x
Dry-bulb temperature	x	x	x	x	x
Wet-bulb temperature	x	x	x	x	x[1]
Windspeed	x	x	x	x	x
Precip. amount	x	x	x	x	x
24-hr. max. temp.	x	x	x		
24-hr. min. temp.	x	x	x		
24-hr. max. RH	x	x			
24-hr. min. RH	x	x			
1/2-inch stick moisture	x			x	

[1]If not available, relative humidity (RH) or dewpoint may be substituted.

(2) **Second Lead Card (see appendix I).**— This card contains information about the fuel model and fire season. Included on this card are the fuel model designation, loadings in tons per acre of the 1-, 10-, and 100-Hour Timelag dead fuels and live fuels, fuel surface-area-to-volume ratios for the different fuel classes, the fuel depth, and the beginning and ending dates of the fire season. This information (except the fire season) for each fuel model is contained in table 2.

Table 2.--NFDR fuel models (1972)

Fuel model	Fuel loading				Surface area to volume				Bed depth
	1-hr load	10-hr load	100-hr load	Living load	1-hr sigma	10-hr sigma	100-hr sigma	Living sigma	
	Tons per acre				$Feet^{-1}$				Feet
A	1.25	0.0	0.0	0.0	3000	109	30	1500	0.75
B	5.00	4.0	2.0	2.0	2000	109	30	1500	6.00
C	1.50	1.0	0.0	0.0	2700	109	30	1500	1.00
D	1.50	2.5	2.0	0.0	1750	109	30	1500	2.50
E	1.50	1.0	0.0	0.0	2500	109	30	1500	0.30
F	1.00	0.5	0.0	2.0	1500	109	30	1500	2.00
G	3.00	2.0	5.0	0.0	1500	109	30	1500	1.25
H	1.00	1.0	1.0	0.0	2000	109	30	1500	0.40
I	4.00	5.0	10.0	0.0	1500	109	30	1500	3.50

(3) **Ambient Conditions (see appendix II).** — These data contain records of specific ambient weather conditions necessary to determine the fire-danger indexes. Only those data falling inside the fire season defined on the Second Lead Card will be used in computing the fire-danger indexes. The data format for the ambient conditions (appendix II) was designed for use with the Form WB 612-17, the 10-Day Fire Danger and Weather Record. Depending on the input device designated on the First Lead Card, the program is capable of reading the ambient conditions on either punched cards or a BCD tape of single card records. There is no limit to the number or records that can be read. If punched cards are used, a card containing 999999 in columns 1-6 must be the last card for each station. Computations for a given station will be completed and a new set of lead cards will be read when the 999999 card is encountered. If the data are on magnetic tape, a new set of lead cards will be read when a station number of greater magnitude is encountered. Therefore the data must be sorted in ascending order by station number. Fuel moisture values carry over from day to day, so the data should be arranged in ascending order by date for each station on both cards and tape. See figure 1 for an example of an input data deck.

Output

There are four parts to the output of program FIRDAT:

(1) **Daily Information List.** — This part of the output provides a line per card listing of weather parameters and fire-danger components and indexes. It is optional and may be suppressed by making the proper entry on the First Lead Card.

(2) **Frequency Tabulations.** — For any or all of the six fire-danger components and indexes, the absolute, relative, and cumulative frequencies are tabulated along with the class upper boundary. The choice of indexes to be tabulated is made on the First Lead Card (see appendix I).

(3) **Cumulative Frequency Distribution.** — A cumulative frequency curve will be printed on the computer page for the indexes designated in the output options.

(4) **Auxiliary Output of Components and Indexes.** — The program has an output feature whereby the station number, date, and the six fire components and indexes can be punched on cards or written in BCD on magnetic tape. This option is on the First Lead Card.

The auxiliary output will contain two header cards per station run plus one card per observation containing indices, arranged and formated as follows:

Header Card 1	Col.	1-6	Station Number
Header Card 2	Col.	1-6	Station Number
		7-10	Fuel Model Type
		11-30	Station Name
		31	Slope Class
		32-36	Station Elevation (feet)
Card/observation		1-6	Station Number
		7-8	Year
		9-10	Month
		11-12	Day
		13-15	Probability of Ignition
		16-18	Spread Factor
		19-21	Energy Release
		22-24	Occurrence Index
		25-27	Burning Index
		28-30	Fire Load Index

This output is arranged to be compatible with a followup program which will display the seasonal variation of the indexes graphically.

Examples of the output are found in appendix III ; a flow chart of FIRDAT is in appendix IV.

Assumptions

For many initial applications of the NFDR System, the historic data available will not include some of the parameters needed to compute the fire-danger indexes and components. Some assumptions were made to fulfill data requirements. These assumptions will depend upon the data available which, in turn, will determine which data option will be chosen by the user. The following assumptions were made for each option.

Option I. — No assumptions are made to fill missing data. All necessary data are provided.

Option II. — The 10-Hour Timelag Fuel Moisture is computed from observed temperature and humidity instead of being observed from 1/2-inch fuel moisture sticks (analog).

Option III. — In addition to the assumption in Option II, the maximum and minimum relative humidities are computed from the maximum and minimum temperatures, assuming constant specific humidity for the day.

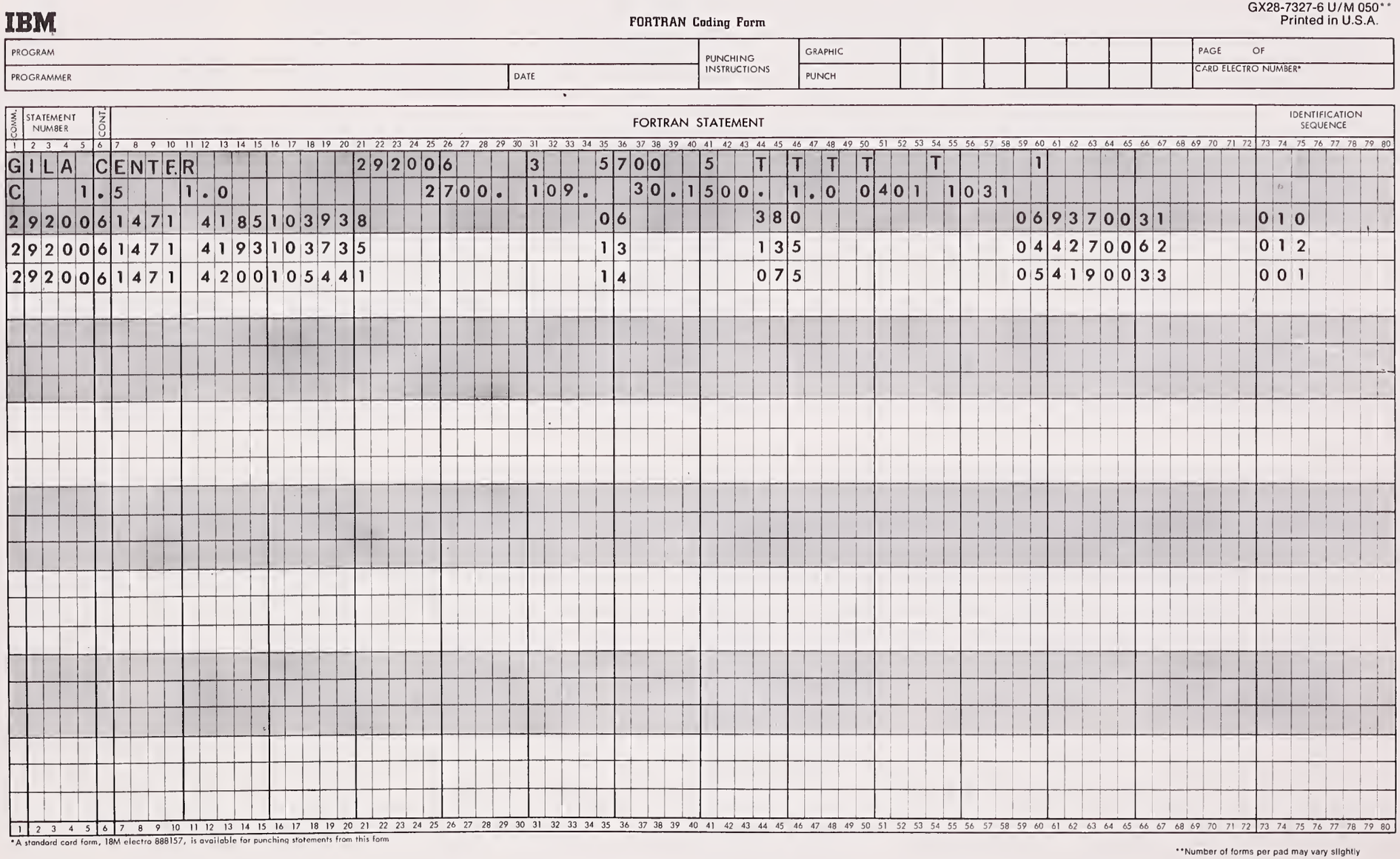

Figure 1.--Example of input data deck.

Option IV. — The 100-Hour Timelag Fuel Moisture is computed from "yesterday's" 10- and 100-Hour Timelag Fuel Moisture and "today's" 10-Hour Timelag Fuel Moisture rather than from average temperature and humidity. The 10-Hour Timelag Fuel Moisture is the measured fuel moisture from the 1/2-inch fuel moisture sticks.

Option V. — This option is a combination of Options II and IV.

In addition to the assumptions made as required by the options, other assumptions are made for each observation and are independent of which option is selected. Among these are:

a. All risk values are assigned inside the program. Lightning and man-caused risk are set to 5 each for a total risk of 10.
b. If precipitation has occurred in any amount during the past 24 hours, the precipitation duration is set to 1 hour.
c. If the state of the weather indicates precipitation was occurring at the time of the observation, the fine fuel moisture and the 10-Hour Timelag Fuel Moisture (except for 1/2-inch fuel sticks) is set to 31 percent and 25 percent, respectively.
d. Living fuel moisture (woody) is set to 100 percent.

In selecting these options we felt that the five most desirable and likely combinations of data parameters were represented.

Missing Data

At several points in the program, certain data parameters are checked to determine if they have a zero value or are missing (blank). If zero or missing values are detected, that data card is usually ignored and the program proceeds to the next card. The parameters checked include:

Parameter	Value to reject	Option
Temperature	misg/u*	I-V
Relative humidity	0/misg/u	I-V
Windspeed	misg/u	I-V
Tmax - Tmin	misg/u	I-III
RHmax - RHmin	misg/u	I,II
1/2-inch stick moisture	0/misg	I,IV

*u - unrecognizable character.

Subroutines

Unless otherwise stated, all subroutines and functions are called only from the main program. Subroutines are arranged in alphabetical order, not in the order in which they are called.

Function ADJFFM

Function ADJFFM will return a value for fine fuel moisture in percent for values of 1-Hour Timelag Fuel Moisture and percent green herbaceous vegetation. This function is essentially a table look-up process. No adjustment will be made to the 1-Hour Timelag Fuel Moisture if the herbaceous vegetative condition is cured (less than 10 percent green material, appendix II).

An unrecognizable value for herbaceous condition or stage will result in a default value of 30 percent for percentage of green herbaceous material.

Subroutine CØDPRC

This routine accepts encoded over-punched numeric data, originally read in A1 format, and returns the numeric value signed plus. A missing-flag is returned ".TRUE." if the field contains any invalid code combination (legitimate codes are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11-0, 11-1, 11-2, etc., 11-9, 12-0, 12-1, . . . 12-0, 12-1, . . . 12-9, 12-ONLY, 11-ONLY, BLANK). A blank-flag is set ".TRUE." if the field is blank, and a negative-flag is set ".TRUE." if an 11-overpunch is present (12-overpunch treated as if not present, i.e., 12-3 = 3). The returned floating point value is always signed plus. CØDPRC is called from subroutine SCAN.

Subroutine CUM

When all the data for a given station have been read, the subroutine CUM is called. Here the absolute, relative, and cumulative frequencies are computed for the desired indexes, and the number of classes is decided upon for plotting purposes. The number of classes chosen is that necessary to account for 99.5 percent of the data.

Function EQMC

This function returns a value of equilibrium moisture content for wood, given temperature

(°F) and relative humidity (%). The value is derived from regressions of the Forest Products Laboratory Tables (Simard 1968). This function is called from Subroutine M100 as well as from the main program.

Function FFMCHS

This function computes the 1-Hour Timelag Fuel Moisture (percent). Function arguments are dry bulb temperature (°F), relative humidity (%), and cloud cover (decimal).

Function GFNC

Given the packing ratio (B), volume to area ratio (S), and optimum packing ratio (BØPT), this function will deliver the maximum reaction intensity.

Function H2PCNV

This function returns approximate pressures in millibars given elevation in feet m.s.l. The function uses the same elevation ranges used in Weather Bureau psychrometric tables.

Real Function MXFNC

Given percent green and 1-Hour Timelag Fuel Moisture, this function computes and returns the extinction moisture content (%) for living herbaceous fuels.

Subroutine M100

This subroutine computes the 100-Hour Timelag Fuel Moisture (%) from Fosberg's (1972) theoretical solution. The arguments for this subroutine are 24-hour average temperature (°F), average relative humidity (%), and duration of precipitation (hrs) for the preceding 24 hours. This subroutine is used in options I-III. Function EQMC is called to deliver equilibrium moisture content.

Subroutine M100A

This subroutine estimates the 100-Hour Timelag Fuel Moisture from a stochastic model given inputs of yesterday's 10- and 100-Hour Timelag Fuel Moisture and today's 10-Hour Timelag Fuel Moisture. This subroutine is used in options IV and V where average temperature and humidity are not available.

Subroutine PLØTR

This subroutine contains the instructions to plot the cumulative frequency distribution of the index specified by the index number in the argument list. If the number of classes is less than or equal to five, or if there are fewer than 100 data points, no graph will be plotted and the appropriate error message will be printed.

Subroutine PRINTR

Class frequencies are printed in tabular form by this subroutine. The variables to be printed are in blank "CØMMØN". The arguments necessary are the number which designates which index is being handled and the number of classes to be considered.

Subroutine PSYCHR

This subroutine computes relative humidity (%) from dry bulb temperature (°A), wet bulb temperature (°A), and pressure (mb). Subroutine VAPØR is called from PSYCHR to deliver saturation vapor pressures. Wet bulb temperatures below 0° C. may be used but no correction has been made for wet bulb icing. The humidities returned will be between 1 and 100 percent inclusive.

Subroutine SCAN

This routine performs alpha-string to floating-point conversion. "-ALPHA-" is an alphanumeric array read as N-A1, "-VALUE-" is the returned real value, "-NWID-" is the number of characters of the field width, "-NDEC-" is the number of digits to be considered to be to the right of the decimal point (same conventions as FORTRAN format specifications), "-MISFLG-" is a logical set ".TRUE." for invalid code combinations or illegal sequences, "-BLKFLG-" is a logical set ".TRUE." if the field in question is entirely blank. "-ØVPØS-" is an integer specifying which character of the field may be legally overpunched. For instance, for a 4 character field, if "-ØVPØS-" were 3, then if an overpunch (11-PUNCH) were found in any position except the 3rd character, the error-flag would be set ".TRUE." and the field considered invalid. A "0" value for "-ØVPØS-"

means that any character may be overpunched, while any negative value of "-ØVPØS-" means that no character may be overpunched. "-MINFLG-" is set ".TRUE." if the field is negative (overpunched). "-MINFLG-" is returned to permit the situation of an overpunched "0" field. CØDPRC is called from SCAN.

Subroutine SET

In subroutine SET, the arrays in which the frequencies are accumulated are initialized and the class interval is determined. This subroutine is used only once at the beginning of each station.

Subroutine SØRT

In subroutine SØRT, the index value is sorted into its proper class, and the number-in-class counters are incremented. This subroutine is accessed for every data card.

Function U20FNC

This function reduces wind measured at 20 feet aboveground to midflame height. It also restricts the maximum reduced wind to limits required by theory for the fuel bed.

Subroutine VAPØR

For a temperature (°A), this subroutine will return the saturation vapor pressure over water (mb). The operation is based on the equation from List's (1966) Smithsonian Meteorological Tables (p. 350). This subroutine is called from program FIRDAT and subroutine PSYCHR.

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Appendix I: Lead card formats

Card field	Columns From	Columns To	Number of columns	Remarks
First Lead Card - Station parameters				
Station name	1	20	20	
Station number	21	26	6	
Slope class		31	1	
Elevation	34	38	5	Feet (right justify)[1]
Input device designation		41	1	1-4, 6-9 = Magnetic tape input (assign magnetic tape logical unit) 5 = Card reader input
Indexes output device designation		42	1	0 - No output 1-9 Fortran logical file no.
Ignition probability		44	1	Enter T to suppress[2]
Rate of spread		46	1	"
Energy release		48	1	"
Occurrence index		50	1	"
Burning index		52	1	"
Fire load index		54	1	"
Daily info list		56	1	"
Data option		60	1	1-5 Inclusive (see table 1)
Second Lead Card - Model name and fuel bed parameters				
Model type	1	4	4	(See table 2)
Fuel loadings				Tons per acre
1-hour timelag	5	9	5	Right justify in field[3]
10-hour timelag	10	14	5	"
100-hour timelag	15	19	5	"
Live	20	24	5	"
Area volume ratio				
1-hour timelag	25	29	5	"
10-hour timelag	30	34	5	"
100-hour timelag	35	39	5	"
Live	40	44	5	"
Bed depth	45	49	5	"
Fire season				
Beginning month	50	51	2	
Beginning day	52	58	2	
Ending month	55	56	2	
Ending day	57	58	2	

[1] *Integer.*
[2] *For CDC 3100 version, use 1 instead of T.*
[3] *Real number—right justify or punch decimal.*

Appendix II: Card punching and verifying instructions for the weather records

Field no.	Card field	Columns From	Columns To	Number of columns	Remarks
	Station number	1	6	6	Upper right corner
	Hour (observation time)	7	8	2	First two digits
	Year (period of time)	9	10	2	Last two digits
	Month (period of time)	11	12	2	(Convert A months to N) (Jan 01; Feb 02, etc.)
1	Day	13	14	2	
2	State of weather	15	15	1	
3	Herbaceous stage	16	16	1	([1])
4	Dry bulb temp.	17	19	3	Minus, "-" overpunch col. 19
5	Wet bulb temp.	20	21	2	Minus, "-" overpunch col. 21
7	Dew point temp.	24	25	2	Minus, "-" overpunch col. 25
8	Relative humidity	26	27	2	100%, punch zeros, "-" over 26
14	Windspeed	35	36	2	100 & over, punch zeros, - "-" over 35
	½" fuel moisture sticks	44	46	3	1 decimal place
34	Maximum temp.	59	61	3	Minus, "-" overpunch col. 61
35	Minimum temp.	62	63	2	Minus, "-" overpunch col. 63
36	Maximum humidity	64	65	2	100%, punch zeros "-" over 64
37	Minimum humidity	66	67	2	
41	24-hour amount	73	75	3	2 decimal places. Decimal blank, punch zero. Trace, punch T00

No data in field, leave blank.
Left fill all fields with zero.

Punch Operator Functions:

The field numbers on the card punch instructions correspond with the numbers printed on the WB Form 612-17.

One detail card per day of the month entry will be punched and verified.

Columns 1 through 12 can be duplicated for each form after the first day is punched.

Credits or minus figures will be punched with a "-" overpunch in the units (low order) position.

Figures which exceed two digits, 100 or more, will be punched with a "-" overpunch in the high order position.

Fields without data, leave blank.

Left fill all data fields with zeros.

[1] *1-cured (10 percent green material); 2-transition (30 percent green material); 3-green (50 percent green material).*

Appendix III: Output

Abbreviations used on Daily Information List

SW - state of the weather
D B TMP - dry bulb temperature
REL HUM - relative humidity
WD SP - windspeed
TMP MAX - 24-hour maximum temperature
TMP MIN - 24-hour minimum temperature
R H MAX - 24-hour maximum relative humidity
R H MIN - 24-hour minimum relative humidity
PPT AMT - 24-hour precipitation amount
PPT DUR - precipitation duration (either 0 or 1)
L R - Lightning Risk
M R - Man-Caused Risk

L F - living fuel moisture (woody vegetation condition)
PC GR - percentage green herbaceous material
1-HR FM - 1-hour timelag dead fuel moisture
ADJ 1-HR - fine fuel moisture
10-HR FM - 10-hour timelag dead fuel moisture
100-HR FM - 100-hour timelag dead fuel moisture
IGN COM - Ignition Component
SPD COM - Spread Component
ENRL COM - Energy Release Component
OCC NDX - Occurrence Index
BUR NDX - Burning Index

NATIONAL FIRE DANGER RATING SYSTEM - OPTION 1 05/21/72

STATION - GILA CENTER (292006) FUEL MODEL C SLOPE 5 ELEV. 5700

DATE	S W	D B TMP	REL HUM	WD SP	TMP MAX	TMP MIN	R H MAX	R H MIN	PPT AMT	PPT DUR	L R	M R	L F	PC GR	1-HR FM	ADJ 1-HR	10HR FM	100 HR	IGN COM	SPD COM	ENRL COM	OCC NDX	BUR NDX
710418	5	30	92	6	69	37	100	31	010	0.	5	5	7	10	31.0	30.0	25.0	0.	0	0	0	0	0
710419	3	37	84	15	44	27	100	62	012	0.	5	5	7	10	19.0	19.0	13.5	0.	0	5	6	0	6
710420	0	54	32	14	54	19	100	33	001	0.	5	5	7	10	6.0	6.0	7.5	0.	46	11	20	47	14
710421	3	50	32	13	59	21	100	23	000	0.	5	5	7	10	7.0	7.0	5.0	0.	35	9	21	36	13
710422	0	58	24	14	60	20	77	23	000	0.	5	5	7	10	4.0	4.0	3.5	0.	64	14	26	66	17
710423	0	67	24	11	68	23	100	23	000	0.	5	5	7	10	4.0	4.0	2.0	0.	66	9	20	68	15
710424	0	67	20	11	70	26	100	19	000	0.	5	5	7	10	4.0	4.0	2.0	0.	66	9	20	68	15
710425	0	67	17	18	71	40	45	15	000	0.	5	5	7	10	3.0	3.0	1.5	0.	76	24	30	78	23
710426	0	59	18	18	70	43	34	12	000	0.	5	5	7	10	4.0	4.0	1.5	0.	64	21	26	66	21
710427	0	65	15	11	66	22	74	13	000	0.	5	5	7	10	3.0	3.0	1.0	0.	76	10	30	78	16
710428	0	63	19	13	68	24	88	16	000	0.	5	5	7	10	4.0	4.0	1.0	0.	65	12	29	67	17
710429	AN	ERROR	HAS	BEEN	FOUND	IN	THE	DATA.	RECORD	HAS	REJECTED.												
710430	AN	ERROR	HAS	BEEN	FOUND	IN	THE	DATA.	RECORD	HAS	REJECTED.												
710501	0	78	10	9	79	25	83	10	000	0.	5	5	7	10	2.0	2.0	1.0	0.	91	9	32	93	15
710502	AN	ERROR	HAS	BEEN	FOUND	IN	THE	DATA.	RECORD	HAS	REJECTED.												
710503	0	78	10	15	82	25	83	9	000	0.	5	5	7	10	2.0	2.0	3.0	0.	91	16	30	93	19
710504	0	69	8	18	86	35	29	6	000	0.	5	5	7	10	2.0	2.0	3.0	0.	89	27	30	91	24
710505	0	66	15	15	71	26	60	12	000	0.	5	5	7	10	3.0	3.0	3.0	0.	76	14	28	78	18
710506	2	62	21	9	69	32	66	18	000	0.	5	5	7	10	5.0	5.0	3.5	0.	51	6	25	52	12
710507	2	67	20	13	70	34	71	19	000	0.	5	5	7	10	5.0	5.0	4.0	0.	52	11	25	53	15
710508	1	69	16	16	73	30	73	15	000	0.	5	5	7	10	3.0	3.0	4.0	0.	77	19	27	79	20
710509	0	70	12	15	71	29	57	12	000	0.	5	5	7	10	2.0	2.0	3.5	0.	89	20	29	91	21
710510	1	70	15	6	72	27	73	14	000	0.	5	5	7	10	3.0	3.0	3.5	0.	77	4	28	79	10
710511	9	63	23	15	75	30	82	15	000	0.	5	5	7	10	5.0	5.0	4.5	0.	52	14	24	53	17
710512	3	64	38	7	65	34	100	32	016	0.	5	5	7	10	8.0	8.0	12.0	0.	32	3	15	33	7
710513	1	71	16	5	71	31	71	16	019	0.	5	5	7	10	3.0	3.0	12.5	0.	77	3	20	79	8
710514	1	76	26	7	76	36	100	16	000	0.	5	5	7	10	4.0	4.0	9.0	0.	68	4	22	70	10
710515	0	79	16	11	80	34	86	16	000	0.	5	5	7	10	3.0	3.0	6.5	0.	79	10	25	81	15
710516	0	79	13	11	82	33	76	13	000	0.	5	5	7	10	3.0	3.0	5.5	0.	79	10	26	81	15
710517	1	71	16	16	81	33	67	12	000	0.	5	5	7	10	3.0	3.0	5.0	0.	77	19	26	79	20
710518	0	63	12	7	74	38	33	9	000	0.	5	5	7	10	2.0	2.0	5.0	0.	87	6	28	89	12
710519	0	71	10	8	71	24	62	11	000	0.	5	5	7	10	2.0	2.0	4.0	0.	89	7	29	91	13
710520	0	78	10	11	78	24	77	11	000	0.	5	5	7	10	2.0	2.0	3.5	0.	91	12	29	93	17
710521	3	73	12	23	80	29	66	10	000	0.	5	5	7	10	3.0	3.0	3.5	0.	73	37	28	75	27
710522	0	70	15	16	78	29	68	11	000	0.	5	5	7	10	3.0	3.0	3.5	0.	77	20	28	79	20
710523	0	69	16	16	73	29	75	15	000	0.	5	5	7	10	3.0	3.0	3.5	0.	77	20	28	79	20
710524	0	75	7	4	75	26	46	7	000	0.	5	5	7	10	1.0	1.0	3.5	0.	100	3	31	100	10
710525	0	81	11	9	81	28	77	7	000	0.	5	5	7	10	2.0	2.0	3.0	0.	92	8	30	94	15
710526	0	80	10	11	82	32	61	10	000	0.	5	5	7	10	2.0	2.0	3.0	0.	92	12	30	94	17
710527	0	80	12	12	83	32	72	10	000	0.	5	5	7	10	2.0	2.0	3.0	0.	92	14	30	94	18
710528	1	77	14	11	82	45	46	12	000	0.	5	5	7	10	3.0	3.0	3.5	0.	79	10	28	81	15
710529	2	65	21	17	79	34	68	14	000	0.	5	5	7	10	5.0	5.0	3.5	0.	52	17	25	53	19
710530	0	69	19	12	70	31	80	19	000	0.	5	5	7	10	4.0	4.0	3.5	0.	66	11	26	68	15
710531	0	73	15	15	74	32	66	15	000	0.	5	5	7	10	3.0	3.0	4.0	0.	78	17	27	80	19
710601	0	77	9	12	77	28	57	10	000	0.	5	5	7	10	2.0	2.0	3.5	0.	91	14	29	93	18
710602	3	78	8	14	80	34	42	8	000	0.	5	5	7	10	2.0	2.0	3.5	0.	86	18	29	88	20
710603	1	76	10	18	78	31	50	8	000	0.	5	5	7	10	2.0	2.0	3.5	0.	91	27	29	93	24
710604	0	77	7	11	78	22	57	7	000	0.	5	5	7	10	1.0	1.0	3.0	0.	100	14	31	100	18
710605	0	80	10	19	82	24	84	7	000	0.	5	5	7	10	2.0	2.0	3.0	0.	92	30	30	94	26
710606	0	82	8	13	84	29	56	8	000	0.	5	5	7	10	1.0	1.0	3.0	0.	100	18	31	100	21

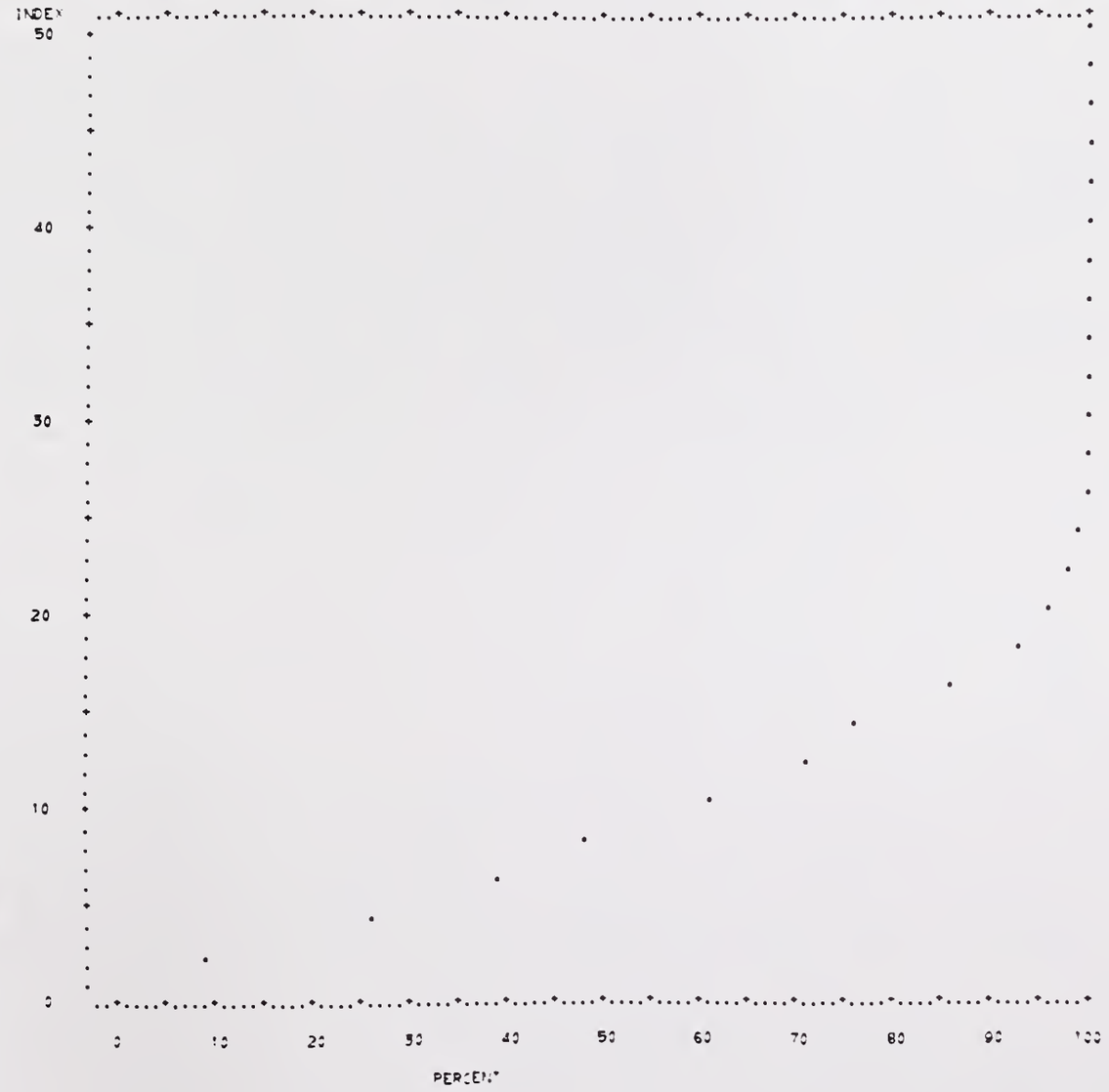
NATIONAL FIRE DANGER RATING SYSTEM - OPTION 1 FREQUENCY DISTRIBUTIONS FOR BURNING INDEX 05/21/

STATION - GILA CENTER -292006 * SLOPE CLASS 3 * MODEL C * FIRE SEASON 401-1031 * NO. PNTS. 220

CLASS NO.	UPPER BDY	NO. IN CLASS	RELATIVE FREQ (PCT)	CUMULATIVE FREQ (PCT)
1	2	19	8.6	8.6
2	4	38	17.3	25.9
3	6	28	12.7	38.6
4	8	20	9.1	47.7
5	10	29	13.2	60.9
6	12	23	10.5	71.4
7	14	11	5.0	76.4
8	16	21	9.5	85.9
9	18	15	6.8	92.7
10	20	8	3.6	96.4
11	22	3	1.4	97.7
12	24	3	1.4	99.1
13	26	1	.5	99.5
14	28	1	0.0	100.0
15	30	0	0.0	100.0
16	32	0	0.0	100.0
17	34	0	0.0	100.0
18	36	0	0.0	100.0
19	38	0	0.0	100.0
20	40	0	0.0	100.0
21	42	0	0.0	100.0
22	44	0	0.0	100.0
23	46	0	0.0	100.0
24	48	0	0.0	100.0
25	50	0	0.0	100.0

NATIONAL FIRE DANGER RATING SYSTEM - OPTION 1 CUMULATIVE FREQUENCY (PCT) - BURNING INDEX 05/21/

STATION - GILA CENTER -292006 * SLOPE CLASS 3 * MODEL C * FIRE SEASON 401-1031 * NO. PNTS. 220



Appendix IV: Flow chart for program FIRDAT